NOTES ON LESSER LONG-EARED BAT NYCTOPHILUS GEOFFROYI IN NORTHERN TASMANIA

by

R. H. GREEN,

QUEEN VICTORIA MUSEUM, LAUNCESTON.

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1. INTRODUCTION

The Lesser Long-eared Bat *Nyctophilus geoffroyi* Leach is one of the most abundant bat species in Tasmania; only the Little Brown Bat *Eptesicus pumilus* appears to be more numerous. The collections of the Queen Victoria Museum reveal that it also has a wide geogrophical range within the State, specimens having been collected at Stanley, Devonport, Green's Beach, Beauty Point, Exeter, Glengarry, Launceston, Prosser's Forest, Myrtle Park, Pioneer, Great Lake, Colebrook, King Island and Flinders Island. (See Fig. 1).

Observations have been made on the species from time to time as opportunity permitted in 1963, 1964 and 1965, and during this period two maternal colonies have come under notice. Progressive collecting of live specimens from these colonies, together with banding and other activities, has permitted the collection of data from both captive and free-living animals. The birth of young in captivity has been observed.

II. MATERNITY COLONIES

(a) The *Beauty Point colony*, located about eight miles inland from the mouth of the Tamar River, was found in the ceiling of an out-building on the edge of the township. The bats were roosting in a narrow space between the corrugated iron roof and the lining boards to which it was fastened. Entry was gained by a gap between the top of the internal wall and the roof. When this colony was first visited on the morning of 27:I:1964, bats could be seen between the gaps in the ceiling boards. One was caught and removed and, while being handled, it uttered sound just audible to the human ear. Its removal from the roost caused the immediate departure of the remainder of the colony but, although two external doors were open, no bats were observed to leave the room, all continuing to fly round in the confined space until they were eventually caught. Four females and two males were thus collected. The females all showed signs of recent lactation but no juvenile or subadult bats could be found. However two juveniles had been found dead on the floor two days previous to my visit. I was informed by the owner that, four to five weeks earlier, activity in the roost had been noticeable; bats had been seen moving about the ceiling fixtures, often with juveniles clining to their fur, and vocal noises could be heard in the roost. By early January this activity had noticeably reduced. At the time of my visit the young bats had apparently been weaned and the roost partly abandoned. The site was not known to have been occupied previously nor has it been since.

(b) The *Green's Beach colony*, on the western side of the mouth of the Tamar River, was first discovered on 15:XI:1964. The bats were occupying a crevice between a wooden floor joist and a cement wall in the basement of a house. Their only entry to the basement was a one inch gap at the top of a door and the site of the roost was a further twelve feet inside the basement. Departing and returning bats often spent some time flying round inside the basement before leaving or re-entering the roost. On such flights they usually rested at intervals by alighting on ledges or the cement walls. Observations and netting were carried out on several subsequent evenings until 5:XII:1964 when the roost was found to have been abandoned. This was the only year the site was known to be occupied.

Although noise and activity were reported as being noticeable in the Beauty Point roost in mid December 1963, this was not the case in the Green's Beach roost in the latter half of November 1964. The presence of the latter colony would not have been detected but for bat faeces falling to the floor. However the juveniles in the latter instance were certainly younger and less developed than would have been the case at the time of observation at Beauty Point.

At the Green's Beach roost the bats could be seen with the aid of a flash light and after the evening exit of the adults the juveniles were usually found gathered together although they were not noticed to cling to each other. No adult bats were mist netted with young attached. When the roost was examined on 5:XII:1964 it was found to have been abandoned. The existence of an alternative roost was suggested by variation in the numbers of individuals present on each night's banding. Abandonment of the roost indicates the possibility that handling and disturbance had caused the females to remove the young to the alternative site. Analogous behaviour had been noted in this species by Ryan (1963) and in *E. pumilus* by Green (1965).

A colony found roosting in the roof of a Church at Colebrook was visited in February and March, 1963 and eight bats (6 ♀♀ and 2 ♂♂) were collected in a mist net set inside the building.

This had probably been a maternity colony.

III. BANDING

At the Green's Beach colony the bats were captured in a mist net suspended across the exit flight line in such a manner that it was not possible for bats leaving the roost to avoid the net. It is assumed with some degree of confidence that all

occupants were collected on each occasion. The period between the first and last departure was about twenty minutes. A total of twenty bats (19♀♀ and 1♂) were netted from the roost on three evenings at weekly intervals (see Table 1). Six of the females were re-netted once and one twice over this period. Of those re-netted on 28:XII:1964 only one had been banded on 20:XI:1964, and this individual was amongst those re-netted on 28:XI:1964. Two pregnant females captured on 15:XI:1964 were not banded and were retained for captive studies. Bats were seen flying in the vicinity of the net on a number of subsequent occasions but none were taken on re-entry flights. Although several bats of the species have subsequently come to hand from the Green's Beach area, none of these were banded.

IV. BREEDING

Of the ten females netted on 15:XI:1964, nine showed signs of advanced pregnancy and one was lactating, having already given birth. The nipples of this bat were distended to 3 mm. and were surrounded by a patch of naked skin about 5 mm. across. No young bats could be seen in the roost. Two of the most heavily pregnant bats were retained for captive studies and the remainder were banded and released.

Of the four taken on 20:XI:1964 three were lactating and one heavily pregnant.

Of the twelve taken on 28:XI:1964 eleven were lactating and one was heavily pregnant.

The two pregnant females retained on 15:XI:1964 were placed in a small portable cage, provided with water, and fed quantities of live blow-flies *(Calliphora sp.)*.

At 4.30 p.m. on 18:XI:1964 one of the females was found to have just given birth to a single male young. She had moved from the wall of the cage, where both females normally hung, to the floor. The young was attached to the left nipple so firmly that removal was difficult without injury to it or the mother. When handled it uttered several faint high pitched squeaks, each of about half a second's duration. It was active and continually struggled for a firmer grip on the fur with the hind feet and the thumbs.

A slight placental blood stain was noticeable around the vent of the female.

This bat failed to produce the normal number of two young and upon preparation and dissection on the following day no signs of a second foetus was found.

This is believed to be only the second recorded instance of a single birth in this species. The other was recorded by Ryan (1963).

At 6.30 p.m. on 18:XI:1964 the second female was found to have just given birth to a single young, a female, on the floor of the cage. The parent was picked up and placed on the palm of the hand, the young being firmly attached to the nipple and ventral fur. She made no attempt to escape but rested quietly with the tail slightly turned under to form a pocket. Here she tended the young by turning her head beneath her body and continually licking the fur and patagium of the young.

Ten minutes after the estimated time of birth a slight heaving of the parent's body was noticed, which was followed by the birth of a second young. By slightly raising the tip of the tail it was possible to watch the birth.

Contractions occurred at intervals of about six seconds and after about a minute the young, a second female, was born tail first. Contractions ceased before the head was expelled, the parent then rested, and the young freed its head by its own efforts. It immediately became active and crawled beneath the parent, in search of the nipple. Its twin was already fastened on the left side. In about one minute it located the right nipple and became fastened to it.

At this stage both young were still attached to the parent by the umbilical cord, though that of the first born was now devoid of blood. The female and twins were then returned to the cage. An hour later the umbilical cord of the first born was found to have parted and that of the second was still intact but colourless.

At 11 p.m. both young were found on the floor of the cage and the parent was resting quietly in its usual roost about twelve inches above. Both young were calling vigorously with faint high pitched squeaks. They were presented to the parent and she accepted them without fuss. There they both quickly located the nipples and became atached by teeth and claws.

The following day both parents, each with their young attached to the ventral surface, were removed from the cage and allowed to fly round in a closed room. Their actions appeared quite normal and they did not appear hindered in any way by the presence of their burdens.

When at rest on a vertical surface the parent normally hangs head down and the weight of the young is taken partly by the patagium which becomes distended to form a cradle-like pocket hanging outwardly over the humerus. (See Plate 2).

In each instance the birth occurred in daylight hours. The seven births of *N. geoffroyi* recorded by Ryan (1963) also occurred during daylight hours.

V. GROWTH AND DEVELOPMENT

The following stages were recorded from eight individuals. (For measurements see Table 2).

Reg. nos. 1964:1:292-4, 1.45 gm. to 1.85 gm. in weight, born in captivity on 18:XI:1964, were naked at birth except for a few fine hairs in the region of the lips. Vibrissae were not prominent. Most milk teeth were well through the gums. (See Fig. 2). All the incisors were tri-cusped, the upper two pairs being well spaced and the lower three pairs more closely grouped and markedly inclined towards the mid line.

The upper canines were bi-cusped, with the minor cusp situated on the inward side of the major cusp. The lower canines were tri-cusped with the outer cusp longest. Two pairs of pre-

Plate 1. Adult female *N. geoffroyi* and suckling twins at one day old.

Plate 2. Adult female *N. geoffroyi* with twins in the resting position. The patagium is distended by the twins to form pockets which hang outwardly over the humerus.

Fig. 1 (Bottom). Sketch map showing the localities mentioned in the text where specimens of *N. geoffroyi* held in the Queen Victoria Museum were collected. "♀" indicates the maternal colonies.

Plate 3. Adult female *N. geoffroyi* and suckling single young at one day old.

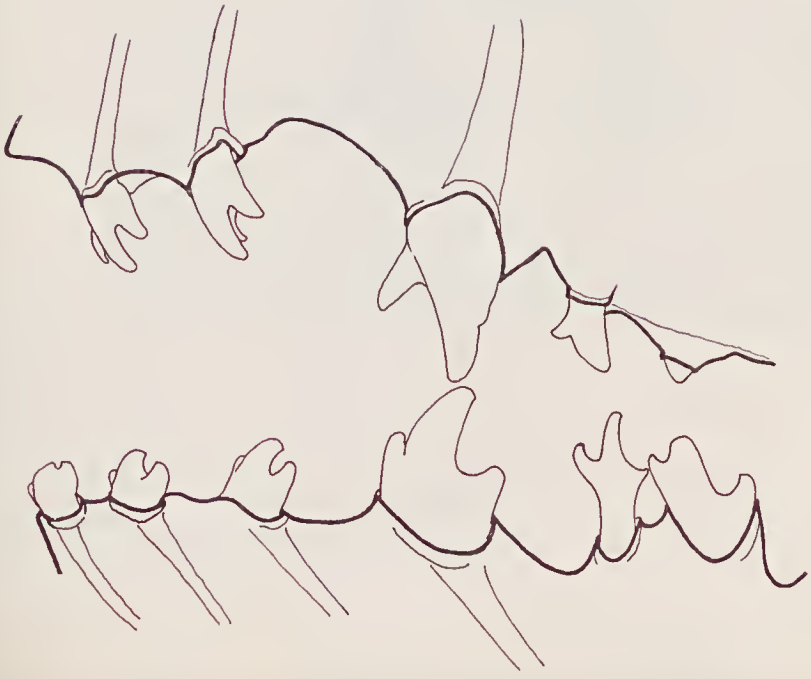

Fig. 2 (Bottom). Showing the deciduous milk teeth in the left side jaws of *N. geoffroyi* at one day old.

Plate 4. Juvenile *N. geoffroyi* Reg. no. 1964:1:303.

molars were usually present in each jaw. The anterior upper was bi-cusped whereas the posterior had only a single cusp, was more robust, but not as advanced in eruption as the former. Both pairs of lower premolars were tri-cusped.

The general morphology of the teeth was such as to give the young bats a very secure grip on the fur or nipples of their parent and was very similar to that found in *Eptesicus pumilus* (Green 1965).

Reg. no. 1964:1:303 (2.39 gm.) was collected on 28:XI:1964. It appeared naked but under microscopic examination fur was found to have erupted over most of the body, particularly on the dorsal surface. (See Plate 4). Vibrissae were becoming noticeable (to 2 mm.).

The normal complement of milk teeth was still present but in this instance the central pair of upper incisors were bi-cusped. An additional fine needle-like milk tooth, which appeared to be non functional, was present where the second molar would erupt in the left upper jaw.

Reg. no. 1964:1:5 which was found in a dessicated condition beneath the Beauty Point roost on 25:I:1964 was noticeably well furred, that on the dorsal surface reaching to 1.5 mm. and the vibrissae to 3 mm. All the milk teeth were present but the permanent lower premolars had commenced to erupt just behind the milk premolars.

Reg. no. 1965:1:1 (5.78 gm.) was collected on 29:XII:1964 when it flew into a house at Green's Beach. The dorsal fur and vibrissae reached to 5 mm. It appeared to be independent of its parent but was smaller than average and apparently not fully grown. The complete set of permanent teeth had recently erupted and gum bruising was still noticeable. The upper milk incisors were still present at the front of the developing permanent incisors.

Reg. no. 1964:1:6 was found recently dead beneath the Beauty Point roost on 25:I:1964. Dorsal fur and vibrissae reached to 5 mm. The full set of permanent teeth had erupted but the upper milk incisors were still present at the front of the permanent incisors.

Reg. no. 1964:1:290 (8.24 gm.) is the largest specimen collected to date. The measurements were taken one day after she had given birth to a male, Reg. no. 1964:1:292.

VI. MISCELLANEOUS

In the third week of January 1964 I was told of the existence of a quantity of bat faeces on the eathern floor of a basement garage beneath a newly built shack at Green's Beach. Upon investigation I was unable to find a diurnal roost though fresh faeces was present. Consequently a watch was maintained on two successive evenings. At dusk on both occasions at least three bats were seen to fly into the basement from outside by way of the garage opening. They repeatedly departed and re-entered and on numerous occasions rested for several minutes on a ledge round the top of the foundations. Two individuals, both females, were subsequently hand caught, identified as *N. geoffroyi*, banded and released. The possibility of a food attraction was not evident though a close watch was kept for the presence of insects.

The quantity and distribution of bat faeces indicated that such flights must have occurred for several weeks but they were not noticed again following my interference. No explanation can be advanced for this behaviour, but the site may have served as a nocturnal roost to which the bats retreated for short periods between hunting flights.

Two such nocturnal retreats of *N. geoffroyi* were observed in Victoria by Ryan (1963).

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TABLE 1. BANDING AND RECOVERIES OF THE GREEN'S BEACH COLONY.
* Two pregnant females retained for captive studies.

DATE	*BANDED*	*RE-NETTED*	*TOTAL*
15:XI:1964	11*	-	11
20:XI:1964	3	1	4
28:XI:1964	6	6	12
TOTAL	20	7	27

TABLE 2. PROGRESSIVE MENSURATION GAIN IN *N. GEOFFROYI.*
Wt. = Weight in grams. T.L. = Total Length. T. = Tail.
E. = Ear. R. = Radius. P. = pes in millimeters.

Reg. No.	Sex	Date	Wt.	T.L.	T.	E.	R.	P.	Remarks
1964:1:292	♂	19:XI:1964	1.85	45	15	—	15	6	1 day old
1964:1:293	♀	19:XI:1964	1.13	41	14	—	12.6	6	„ twins
1964:1:294	♀	19:XI:1964	1.45	43	13	—	14	6	„ twins
1964:1:303	♂	28:XI:1964	2.39	51	16	13	18.5	7	
1964:1:5	♂	—	—	—	—	—	23.5	—	dessicated
1965:1:1	♂	29:XII:1964	5.78	78	32	22	36	7	flying
1964:1:6	♀	25:I:1964	—	—	—	—	38	—	
1964:1:290	♀	20:XI:1964	8.24	101	48	27	43	8.5	adult